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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,159	10/16/2003	Ravi Chidambaran	030569	6637

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EXAMINER

BERNSHTEYN, MICHAEL

ART UNIT	PAPER NUMBER
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1713

DATE MAILED: 10/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/687,159	CHIDAMBARAN ET AL.	
	Examiner	Art Unit	
	Michael Bernshteyn	1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 9,15-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-14 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 1,6,10-14 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Fig. 1-9 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>07/30/2004</u> . | 6) <input type="checkbox"/> Other: ____. |

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DETAILED ACTION

1. Restriction to one of the following inventions is required under 35 U.S.C.

121:

- I. Claims 1-8 and 10-14, drawn to an ion exchange media, classified in class 210, subclass 290.
- II. Claim 9, drawn to an electrodeionization apparatus, classified in class 204, subclass 524.
- III. Claims 15-17, drawn to a method for constructing an ion exchange media, classified in class 210, subclass 638.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions III and I are related as process of making and product made.

The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be used by materially different processes, such as, for example, in a method for purifying water in continuous electrodeionization (CEDI), which includes processes, such as continuous deionization, filled cell electrodialysis, or electrodiuresis (EDR). Also, the claimed method can be done in solution rather than using grinding.

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3. Inventions II and I are related as apparatus and product made. The inventions in this relationship are distinct if either or both of the following can be shown: (1) that the apparatus as claimed is not an obvious apparatus for making the product and the apparatus can be used for making a different product or (2) that the product as claimed can be made by another and materially different apparatus (MPEP § 806.05(g)). In this case the claimed product can be used in batch reactors where the entire electrolyte solution contacts a mass of ion-exchange resin; in commercial semicontinuous and continuous contractors which employ countercurrent moving-bed systems; in fluidized-bed contractors which contain a series of trays or compartments which act as reaction stages, etc.

4. Inventions II and III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions are an electrodeionization apparatus wherein dilute chamber includes the ion exchange media, and a method for constructing the ion exchange media, which certainly cannot be used together and have completely different functions.

5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

6. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II and Group III, restriction for examination purposes as indicated is proper.

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7. During a telephone conversation with Mr. Michael L. Dever on August 09, 2005 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-8 and 10-14. Affirmation of this election should be made by applicant in replying to this Office action. Claims 9, 15-17 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to non-elected invention.

8. Claims 1-8 and 10-14 are active in the Application.

Specification

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC (See 37 CFR 1.52(e)(5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs.) or REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.)
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.

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(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.

(g) BRIEF SUMMARY OF THE INVENTION.

(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).

(i) DETAILED DESCRIPTION OF THE INVENTION.

(j) CLAIM OR CLAIMS (commencing on a separate sheet).

(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).

(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Content of Specification

(a) Title of the Invention: See 37 CFR 1.72(a) and MPEP § 606. The title of the invention should be placed at the top of the first page of the specification unless the title is provided in an application data sheet. The title of the invention should be brief but technically accurate and descriptive, preferably from two to seven words may not contain more than 500 characters.

(b) Cross-References to Related Applications: See 37 CFR 1.78 and MPEP § 201.11.

(c) Statement Regarding Federally Sponsored Research and Development: See MPEP § 310.

(d) The Names Of The Parties To A Joint Research Agreement: See 37 CFR 1.71(g).

(e) Incorporation-By-Reference Of Material Submitted On a Compact Disc: The specification is required to include an incorporation-by-reference of electronic documents that are to become part of the permanent United States Patent and Trademark Office records in the file of a patent application. See 37 CFR 1.52(e) and MPEP § 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text were permitted as electronic documents on compact discs beginning on September 8, 2000.

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Or alternatively, Reference to a "Microfiche Appendix": See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.

- (f) Background of the Invention: See MPEP § 608.01(c). The specification should set forth the Background of the Invention in two parts:
- (1) Field of the Invention: A statement of the field of art to which the invention pertains. This statement may include a paraphrasing of the applicable U.S. patent classification definitions of the subject matter of the claimed invention. This item may also be titled "Technical Field."
 - (2) Description of the Related Art including information disclosed under 37 CFR 1.97 and 37 CFR 1.98: A description of the related art known to the applicant and including, if applicable, references to specific related art and problems involved in the prior art which are solved by the applicant's invention. This item may also be titled "Background Art."
- (g) Brief Summary of the Invention: See MPEP § 608.01(d). A brief summary or general statement of the invention as set forth in 37 CFR 1.73. The summary is separate and distinct from the abstract and is directed toward the invention rather than the disclosure as a whole. The summary may point out the advantages of the invention or how it solves problems previously existent in the prior art (and preferably indicated in the Background of the Invention). In chemical cases it should point out in general terms the utility of the invention. If possible, the nature and gist of the invention or the inventive concept should be set forth. Objects of the invention should be treated briefly and only to the extent that they contribute to an understanding of the invention.
- (h) Brief Description of the Several Views of the Drawing(s): See MPEP § 608.01(f). A reference to and brief description of the drawing(s) as set forth in 37 CFR 1.74.
- (i) Detailed Description of the Invention: See MPEP § 608.01(g). A description of the preferred embodiment(s) of the invention as required in 37 CFR 1.71. The description should be as short and specific as is necessary to describe the invention adequately and accurately. Where elements or groups of elements, compounds, and processes, which are conventional and generally widely known in the field of the invention described and their exact nature or type is not necessary for an understanding and use of the invention by a

person skilled in the art, they should not be described in detail. However, where particularly complicated subject matter is involved or where the elements, compounds, or processes may not be commonly or widely known in the field, the specification should refer to another patent or readily available publication which adequately describes the subject matter.

- (j) Claim or Claims: See 37 CFR 1.75 and MPEP § 608.01(m). The claim or claims must commence on separate sheet or electronic page (37 CFR 1.52(b)(3)). Where a claim sets forth a plurality of elements or steps, each element or step of the claim should be separated by a line indentation. There may be plural indentations to further segregate subcombinations or related steps. See 37 CFR 1.75 and MPEP § 608.01(i)-(p).
- (k) Abstract of the Disclosure: See MPEP § 608.01(f). A brief narrative of the disclosure as a whole in a single paragraph of 150 words or less commencing on a separate sheet following the claims. In an international application which has entered the national stage (37 CFR 1.491(b)), the applicant need not submit an abstract commencing on a separate sheet if an abstract was published with the international application under PCT Article 21. The abstract that appears on the cover page of the pamphlet published by the International Bureau (IB) of the World Intellectual Property Organization (WIPO) is the abstract that will be used by the USPTO. See MPEP § 1893.03(e).
- (l) Sequence Listing. See 37 CFR 1.821-1.825 and MPEP §§ 2421-2431. The requirement for a sequence listing applies to all sequences disclosed in a given application, whether the sequences are claimed or not. See MPEP § 2421.02.

The specification of the disclosure is objected to because it does not satisfy the above criteria. Correction is required.

9. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: there are discrepancies between the claims and the specification. In claims 11-13 the term 'binder' is

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used while in all examples in the specification the term 'suitable binding agent' is used. There is no explanation of the term "binder" in the specification.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claims 11 and 12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is not clear how practically to obtain different concentration of said binder in resin transport framework and in flow path?

The applicant does not show in all examples which exactly binder (or binding agent) was used for preparation anion and cation resin beds. Therefore, there is no way to enable one skilled in the art to which it pertain, or with which it is most nearly connected, to make and/or use the invention. Correction is required.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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11. Claims 1, 6, 10 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term 'substantially' used in all above claims is a relative term, which renders the claims indefinite. The term 'substantially' is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not reasonably appraised of the scope of the invention.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 1-8, 10 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Osawa et al. (U.S. Patent 6,379,518).

With regard to limitation of instant claims 1-8 and 14, Osawa discloses the electrodeionization apparatus, which has a **plurality of cation exchange membranes and plurality of anion exchange membranes alternately arranged between electrodes in such a manner as to alternately form**

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diluting compartments and concentrating compartments. The diluting compartments are filled with an ion exchanger (abstract). He discloses that the electrodeionization apparatus has an anode, a cathode, concentrating compartments, and diluting compartments, which are formed by arranging a plurality of anion exchange membranes and cation exchange membranes between the anode and cathode, ion exchangers filled in the diluting compartments (col. 3, lines 66-67 through col. 4, lines 1-4). The electrodeionization apparatus efficiently removes the weakly-ionized species including silica, boron from the feed water and feed water **flows in order** (col. 4, lines 9-15).

Osawa discloses that the diluting compartment of the electrodeionization apparatus is preferable to have a thickness of equal to or more than 7 mm, and more preferably **8 to 30 mm**. (col. 6, lines 47-49). The ion exchanger filled in the diluting compartments is most preferably **the mixture of the anion exchanger and the cation exchanger**. When applied with high voltage, the ion exchanger may be anion exchanger alone. Some of the diluting compartments may be filled with the mixture of the ion exchangers, and others may be filled with the anion exchanger alone (col. 6, lines 53-59). The ion exchange membrane may be either homogeneous or heterogeneous (col. 7, lines 42-44). FIG. 9 is an exploded perspective view showing the structure of a diluting compartment. The diluting compartment comprises a **rectangular frame 120**, a partition member 121 preferably having conductivity and disposed in the frame 120, an ion exchanger 123 filled in cells 122 formed by the partition member 121, an anion

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exchange membrane 125 which are disposed to sandwich **the frame 120**. The partition member 121 may be electrically conductive. **The frame 120 is provided with a flow inlet 126** for introducing raw water to be treated and a flow inlet 127 for concentrated water in an upper portion thereof and with a **flow outlet 128** for deionized water and a flow outlet 129 for concentrated water formed in an low portion thereof (col. 11, lines 18-29).

Osawa discloses that **actually a plurality of channels 126a is formed in the upper portion of the frame 120** to uniformly distribute the raw water into the respective top cells aligned in the lateral direction (col. 11, lines 34-37). The partition member 121 is in a honeycomb form of a hexagonal shape in which a large number of cells are arranged in vertical and lateral directions in such a manner that a pair of sides of each cell 122 extend **in the longitudinal direction of the frame 120**, i.e. in the vertical direction (col. 11, lines 44-49). The ion exchanger to be filled in the cells 122 (FIG. 10) may be an anion exchanger, a cation exchanger, an amphoteric ion exchanger, or a mixture of at least two of them (col. 12, lines 24-26). The ion exchanger to be filled is normally an **ion exchanger resin** (col. 12, lines 39-41).

With regard to substantially nonporous resin transport framework instantly claimed in claim 1, Osawa is silent about it. However, in view of substantially identical ion exchange media between Osawa and instant claims, it is the examiner position that Osawa inherently possesses this property because it is clear shown in FIG 9, that the frame 120 is provided with flow inlets 126, 127 and

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with flow outlets 128, 129 (col. 11, lines 18-29) which could be made only from solid (nonporous) resin.

Since the USPTO does not have equipment to do the analytical test, the burden is now shifted to the applicant to prove otherwise. *In re Fitzgerald* 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980).

15. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Osawa in view of Nidola et al. (U.S. Patent 5,015,344).

The disclosure of Osawa reference resided in § 12 is incorporated herein by reference.

With regard to limitation of the instant claims 11-13, Osawa does not disclose that resin transport framework and flow path are comprised of a binder with different concentration and porosity.

Nidola discloses that suitable binder, resistant to the aggressive cell environment, is used to obtain an adequate bonding. Preferred binders include processable polymers of organic monomers which on polymerization form a carbon chain. Such materials include polymers of tetrafluoroethylene and/or chlorotrifluoroethylene and similar polymers, which may also contain **cation exchange groups**. Furthermore the binder may be the same or substantially the same composition as the membrane to which it is bonded (col. 3, lines 43-54).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of suitable binders of Nidola in ion exchange media of Osawa in order to achieve good

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resistance to the aggressive cell environment, and adequate bonding (US'344, (col. 3, lines 43-54).

Thus, the combination of Osawa and Nidola renders instant claims *prima facie* obvious in view of absent of unexpected results commensurate in scope of claims.

Conclusion

Other references used but not cited in this office include U.S. Patents 6,379,518, 5,015,344, 5,858,191, 6,607,647, 5,116,509, 6,375,851, 6,054,230, 6,156,180, 5,316,637, 4,931,160, 6,187,826, 6,248,797, 6,437,010, 5,410,672, 3,271,163, U.S. Patent Application Publications 2003/0079992, 2003/0152820, 2003/0132104 and 2003/0173282 are shown on the Notice of References Cited Form (PTO-892).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Bernshteyn whose telephone number is 571-272-2411. The examiner can normally be reached on M-F 8-5:30.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael Bernshteyn
Patent Examiner
Art Unit 1713

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09/27/2005


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